In the Title

Please replace the title of this application with the following:

-- NO-FLOW UNDERFILL MATERIAL --

In the Specification

Please replace Paragraph [0010] on Page 5 of the specification with the following:

-- **[0010]** A no-flow underfill material is provided that includes at least:

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(i) an epoxy Siloxirane™ resin;

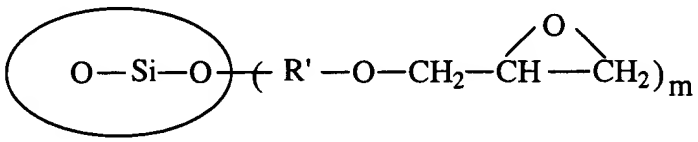
(ii) at least one agent acting as a cross-linking hardener capable of curing an epoxy resin and a curing catalyst capable of catalyzing the curing of the epoxy resin; and

(iii) a compatible fluxing agent. --

Please replace Paragraph [0011] on Pages 5 and 6 of the specification with the following:

-- **[0011]** The Siloxirane™ resin may in its pre-cure monomer state be represented

A2 by:



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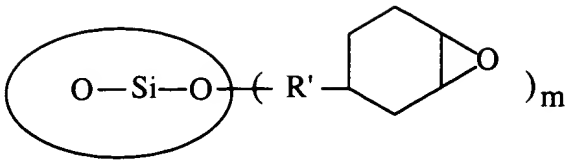
or



(2)

where m is the number of reactive oxirane groups on the surface of the O-Si-O domain and m ranges from 1 to 30. R′ is selected from the group consisting of phenylene, bisphenylene, carbonyl, and alkylene. The alkylene herein refers to a branched or unbranched saturated hydrocarbon group of 1 to 24 carbon atoms, such as methylene ("Me"), ethylene ("Et"), *n*-propylene, isopropylene, *n*-butylene, isobutylene, *t*-butylene, octylene, decylene, and the like. Preferred alkylene groups herein contain from 1 to 12 carbon atoms. An organic moiety may be used in the monomer in eq. 1 to link the SiO_2 group with the oxirane group. --

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Please replace Paragraph [0015] on Pages 6 and 7 of the specification with the following:

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-- **[0015]** The agent acting as a cross-linking hardener and a catalyst may be a single material such as an imidazole or its derivative, triphenylphosphine, or an onium salt. The agent may include a separate hardener and catalyst. The hardener may for example be an amine, an anhydride, a poly amide, a polyamide amine, or a phenolic resin, and the catalyst may be an imidazolium salt, or a tertiary amine. The agent, during curing, creates a polymerized polymer out of the monomer with a three-dimensional cross-linked structure. The ratio at which the imidazole or its derivatives, or tripheylphosphine, or onium salt that is added in the formulation ranges from 0.01wt% to 20wt% of the weight of the Siloxirane™ resin. The ratio at which amine, or

polyamide, or polyamide amine that is added in the formulation is 1 reactive amine hydrogen equivalent to 0.1 to 10 epoxide equivalent of the Siloxirane™ resin. The ratio at which anhydride that is added in the formulation is 1 anhydride ring equivalent to 0.1 to 10 epoxide equivalent weight of the Siloxirane™ resin. --

A3

Please replace Paragraph [0016] on Page 7 of the specification with the following:

-- **[0016]** The fluxing agent can be any acid which can be dissolved in the Siloxirane™ resin and the agent. The fluxing agent is preferably an organic carboxylic acid, or a polymeric fluxing agent, or an organic compound that contains one or more hydroxyl groups. The fluxing agent may for example be a glutaric acid or a trifluro acetic acid. The ratio at which a fluxing agent that is added in the formulation ranges from 0.1wt% to 20wt% of the weight of the Siloxirane™ resin. --

A4

Please replace Paragraph [0017] on Page 7 of the specification with the following:

-- **[0017]** The material preferably further includes an adhesion promoter to further increase the adhesion strength between underfill material and all contact surfaces. The adhesion promoter may for example be a silane coupling agent, an organo-ziconate, or an organo-titanate. The ratio at which an adhesion promoter is added in the formulation ranges from 0.01wt% to 10wt% of the weight of the Siloxirane™ resin. --

Please replace Paragraph [0018] on Page 7 of the specification with the following:

-- **[0018]** The material preferably further includes a non-ionic surfactant to help material flow and eliminate process voids. The surfactant may be a polyol, a siloxane compound, or a fluorinated compound such as FC-430 from 3M Corporation of St. Paul, Minnesota. The ratio at which an adhesion promoter is added in the formulation ranges from 0.01wt% to 10wt% of the weight of the Siloxirane™ resin.

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Please replace Paragraph [0019] on Page 8 of the specification with the following:

-- **[0019]** The material preferably further includes a de-foaming agent which prevents air entry and bubble formation during processing. The de-foaming agent may for example be BYK-066 from BYK-chemie of Wesel in Germany. The ratio at which a de-foaming agent is added in the formulation ranges from 0.01wt% to 10wt% of the weight of the Siloxirane™ resin. --

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Please replace Paragraph [0020] on Page 8 of the specification with the following:

-- **[0020]** The material preferably further includes fused silica to further reduce CTE and moisture uptake, and increase modulus. The ratio at which a fused silica is added in the formulation ranges from 1wt% to 300wt% of the weight of the Siloxirane™ resin. --

Please replace Paragraph [0021] on Page 8 of the specification with the following:

-- **[0021]** The material preferably further includes silver flakes to provide electrical conductivity. The ratio at which a silver flake is added in the formulation ranges from 10wt% to 500wt% of the weight of the Siloxirane™ resin. --

[Please replace Paragraph [0022] on Pages 8 and 9 of the specification with the following:]

-- **[0022]** The material preferably further includes thermally conductive particles to provide desired thermal conductivity. The thermally conductive particles may for example be silicon nitride, silicon borate, alumina, diamond, or silicon oxide. The ratio at which a thermally conductive particle is added in the formulation ranges from 10wt% to 500wt% of the weight of the Siloxirane™ resin.

A6 cont.

Example 1

a. Siloxirane™ resin (eq. 1 or 2):	100 part (by weight)
b. 2-ethyl-4-methyl imidazole acting as both hardener and catalyst:	4 parts
c. Glutaric acid as a fluxing agent:	4.0 part
d. FC-430 as a surfactant:	0.2 part
e. BYK-066 (defoaming agent):	0.05 part
f. 3-glycidoxy propyl methyl diisopropenoxy silane (adhesion promoter):	0.2 part
g. fused silica filler:	40 parts

Example 2

a. Siloxirane™ resin (eq. 1 or 2):	100 part (by weight)
b. methyl hexahydrophthalic anhydride acting as a hardener:	100 parts
c. triphenylphospine acting as a catalyst:	0.8 parts
d. Glutaric acid as a fluxing agent:	8.0 part
e. glycerol (assisting fluxing agent):	8.0 parts
f. polyoxyethylene (surfactant):	0.4 part
g. BYK-066:	0.1 part
h. neopentyl (diallyl)oxy tri(N-ethylenediamineo) ethyl titanate (adhesion promoter):	0.6 part
i. silicon nitride (thermally conductive particles):	100 parts

Example 3

a.	Siloxirane™ resin (eq. 1 or 2):	100 part (by weight)
b	2-phenyl-4,5-dihydroxymethylimidazole:	6 parts
c.	trifluoro acetic acid as a fluxing agent:	4.0 part
d.	silicone as a surfactant:	0.4 part
e.	BYK-066:	0.05 part
f.	neopentyl(diallyl)oxy tri(dioctyl) pyrophosphato zirconate (adhesion promoter):	0.3 part
g.	silver flakes (electrically conductive filler):	300 parts

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In the Claims

Claims 1 thru 26 are pending in the present application and reflect corrections made pursuant to the Examiner's request. Claims 27 and 28 are new.

Sub C1

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1. (Amended) A no-flow underfill material comprising:

an epoxy Siloxirane™ based resin;

at least one agent acting as a cross-linking hardener and a curing catalyst capable of catalyzing the curing of the epoxy resin; and

a fluxing agent.

2. (Amended) The material of claim 1 wherein the Siloxirane™ based resin is represented by:

R1 — R3 — R2

where R1 includes SiO_2

R2 is a reactive organic functional group, and

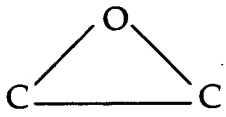
A7 R3 is an organic chain segment.

3. The material of claim 2 wherein R1 is a surface-grafted fused silica particle with a size less than 50 microns.

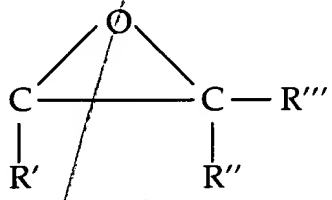
A8 Sub 4. (Amended) The material of claim 3 wherein a structure of R1 is a cyclic SiO_2 domain.

5. The material of claim 2 wherein R1 includes an oxygen atom linked to the silica particle, R3 being linked to the oxygen atom.

Sub C' A9 6. (Amended) The material of claim 2 wherein R2 includes an oxirane group represented by:

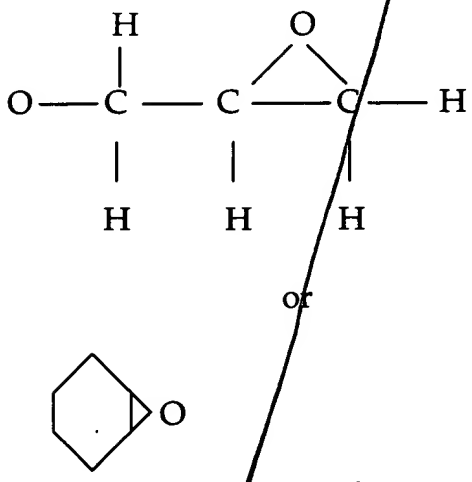


7. (Amended) The material of claim 6 wherein R2 is represented by:



Wherein R′, R″, and R‴ are hydrogen or alkyl groups.

8. (Amended) The material of claim 7 wherein R2 is represented by:



or

9. The material of claim 1 wherein the agent acting as a cross-linking hardener and a catalyst includes both a hardener and a catalyst.

10. (Amended) The material of claim 1 wherein the cross-linking hardener is selected from the group consisting of an imidazole and its derivatives, an amine, a triphenylphosphine, an anhydride, a polyamide, a polyamide amine, a phenolic resin, and an onium salt.

11. The material of claim 1 wherein the catalyst is selected from the group consisting of an imidazole and its derivatives, an imidazolium salt, a triphenylphosphine, a tertiary amine, and an onium salt.

12. (Amended) The material of claim 1 wherein the fluxing agent is dissolved in a mixture of the epoxy Siloxirane™ based resin and the agent acting as a cross-linking

hardener.

13. The material of claim 1 wherein the fluxing agent is selected from the group consisting of an organic carboxylic acid, a polymeric fluxing agent, and an organic compound that contains one or more hydroxyl groups.

14. The material of claim 1 further comprising:

an adhesion promoter.

15. The material of claim 14 wherein the adhesion promoter is selected from the group consisting of a silane coupling agent, an organo-ziconate, and an organo-titanate.

16. The material of claim 1 further comprising:

a non-iomic surfactant.

A12 Sub C1

17. (Amended) The material of claim 16 wherein the surfactant is selected from the group consisting of polyol, a siloxane compound, and a fluorinated compound.

18. The material of claim 1 further comprising:

fused silica.

19. The material of claim 1 further comprising:

silver flakes.

20. The material of claim 1 further comprising:

thermally conductive particles.

21. The material of claim 20 wherein the thermally conductive particles include a material selected from the group consisting of silicon nitride, silicon borate, alumina, diamond, and silicon oxide.

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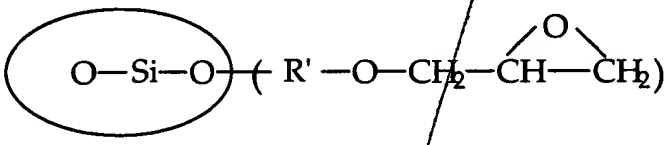
22. (Amended) A no-flow underfill material comprising:

an epoxy resin represented by



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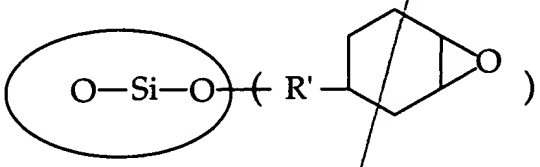
or



(2);

at least one agent acting as a cross-linking hardener and a curing catalyst capable of catalyzing the curing of the epoxy resin; and

a fluxing agent.

23. (Amended) The no-flow underfill material of claim 22 further comprising:

an adhesion promoter;

a non-ionic surfactant;

fused silica;

silver flakes; and

thermally conductive particles.

24. The no-flow underfill material of claim 22 wherein the agent acting as a cross-linking hardener and a catalyst includes both a hardener and a catalyst.

25. (Amended) A semiconductor package comprising:

a package substrate;

bond pads on the substrate;

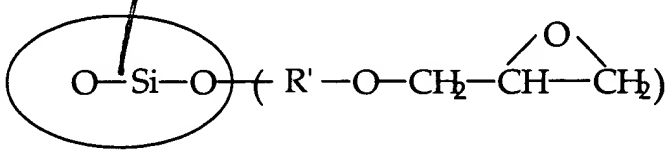
a semiconductor die;

contact pads on the semiconductor die;

a respective conductive bump on each contact pad, the die being located so that each bump is in contact and attached to a respective bond pad; and

an underfill material filling regions between the bumps and including at least an epoxy Siloxirane™ based resin.

26. (Amended) The semiconductor package of claim 25 wherein the epoxy Siloxirane™ based resin is represented by:



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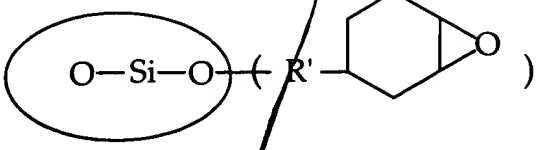
or



27. (New) The no-flow underfill material of Claim 22 wherein the epoxy resin is an epoxy Siloxirane™ resin.

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28. (New) A semiconductor package comprising:

a package substrate;

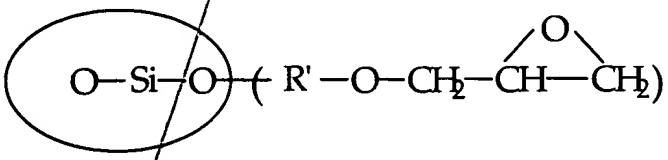
bond pads on the substrate;

a semiconductor die;

contact pads on the semiconductor die;

a respective conductive bump on each contact pad, the die being located so that each bump is in contact and attached to a respective bond pad; and

an underfill material filling regions between the bumps and including at least an epoxy resin represented by:



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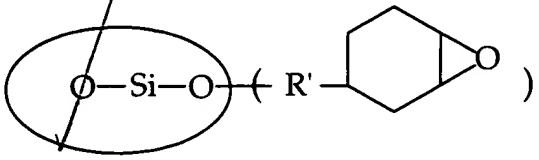

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